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U. S. FOREST SERVICE RESEARCH NOTE WO - 4
U. S. DEPARTMENT OF AGRICULTURE . WASHINGTON, D.C.
MARCH 1964

DDT and DDE Residues in Soil at the Beltsville, Md., Aerial Test Circle in 1963

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JUL 23 1964
CURRENT SERIAL RECORDS

For several years DDT sprays were used in aerial spraying studies conducted by the Beltsville, Md., Forest Insect Laboratory. Many of the tests were made over a test circle on the east side of the north runway of the Beltsville airport. The records available indicate that a total of 70 to 100 pounds of DDT per acre were sprayed over the center of this circle from 1951 through 1958. Little or no DDT has been applied since 1958.

Agricultural lime has been applied to this area from time to time. However, no record was kept of the quantities applied or the dates of the applications.

On May 31, 1963, a cylinder of soil 4.7 inches in diameter and 6 inches long was removed from near the center of the test circle and analyzed to determine approximately how much of the DDT applied to the circle remained in the soil.

ANALYTICAL PROCEDURE

The soil sample was obtained by driving a tin cylinder 6 inches into the ground, removing it with the soil intact, and cutting it away from the soil. The soil cylinder was sectioned into six 1-inch layers, and each layer of soil was air dried. The average weight of the air-dried soil was 18 g. per cu. in.

Twenty-five grams of each layer of soil was moistened with water and extracted twice with a mixture of 50 ml. of isopropyl alcohol and 100 ml. of benzene. Excess water was added, and the benzene layer was removed for chromatographic analysis. The analyses were made with a Barber-Coleman[1] gas chromatograph equipped for electron capture detection (Moore 1962). The samples were run on a 1-percent SE 30 column at 197° C.; the detector cell and flash heater were held at 230° C. Nitrogen gas was used at 15 p.s.i. entrance pressure. The voltage on the cell was 9 v.

Before the last 6-inch layer of soil could be analyzed, an air conditioner in the chromatography room became defective, and abnormal temperature fluctuations in the room made it necessary to discontinue the analyses.

RESULTS

The quantities of p-p' DDT and DDE found in each of the first 5 inches of soil were as follows:

Soil layer	p-p' DDT		DDE	
	p.p.m.	lbs./acre	p.p.m.	lbs./acre
1st inch	9.7	2.44	3.7	0.93
2d inch	2.5	.63	1.4	.35
3d inch	.8	.20	.4	.10
4th inch	.4	.10	.2	.05
5th inch	.4	.10	.2	.05
Total		3.47		1.48

The first inch of soil contained a higher proportion of both residues than the other 4 inches combined.

No standard was available for quantitating the o-p' isomer. However, for all samples the ratio of peak heights for o-p' DDT and p-p' DDT was the same as that found in most samples of technical DDT, indicating that the rate of loss was the same for both isomers.

The technical DDT used for the tests conducted over this circle is assumed to have been about 70 percent p-p' DDT. Therefore, the 3.5 lbs. of p-p' DDT recovered would represent 5.0 lbs. of technical DDT.

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[1] Use of company or brand names does not imply sole endorsement of the products mentioned.

These results indicate that 5 to 7 percent of the DDT that was applied over this area is still present in the soil as DDT and that 1.5 to 2 percent is present as the breakdown product DDE.

Even the double extraction procedures used probably did not remove all the DDT and DDE residues. Also, there was probably some residue below the 5-inch soil layer. Therefore, the DDT and DDE in the soil are likely somewhat greater than indicated by the analyses.

A temperature programed run was made with one of the samples to see how many peaks were present other than those of p-p' and o-p' DDT and DDE. Eleven definite peaks came through ahead of these isomers. It is not known whether these peaks were from some of the materials present in small quantities in the technical DDT or breakdown products, or both.

REFERENCE CITED

Moore, A. D. 1962. Electron capture with an argon ionization detector in gas chromatographic analysis of insecticides. Jour. Econ. Ent. 55(2): 271-272.

GPO 871-688